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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/189,098 | 11/09/1998 | ALAN R. REINBERG | 3528US-(97-1 | 5116 |

7590 10/21/2002

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EXAMINER

WEISS, HOWARD

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2814

DATE MAILED: 10/21/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/189,098

Applicant(s)

REINBERG, ALAN R.

Examiner

Howard Weiss

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 June 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 and 32-71 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 and 32-71 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other.

Art Unit: 2814

Attorney's Docket Number: 3528US-(97-1099)

Filing Date: 11/9/98

Continuing Data: RCE established 2/21/01

Claimed Foreign Priority Date: none

Applicant(s): Reinberg

Examiner: Howard Weiss

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/14/02 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1 to 11, 32 to 38 and 68 to 71 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The instant invention claims an intermediate conductive layer contacting a structure located beneath a silicon-containing dielectric layer of the semiconductive device. However, neither the Specification describes nor any of the figures show a conductive layer contacting a structure located beneath a silicon-containing dielectric layer. What is shown in the figures are structures located either

above or within dielectric layers and in contact with a conductive layer. For example, Figure 2 shows the intermediate conductive layer **16** contacting the structure **12** which is within (not under) the dielectric layer **19**.

Claim Rejections - 35 USC § 102 / 103

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

- (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Initially, and with respect to Claims 32 to 38, 70 and 71, note that a "product by process" claim is directed to the product per se, no matter how actually made. See In re Thorpe et al., 227 USPQ 964 (CAFC, 1985) and the related case law cited therein which make it clear that it is the final product *per se* which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. As stated in Thorpe,

even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. *In re Brown*, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972); *In re Pilkington*, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969); *Buono v. Yankee Maid Dress Corp.*, 77 F.2d 274, 279, 26 USPQ 57, 61 (2d. Cir. 1935).

Note that Applicant has burden of proof in such cases as the above case law makes clear.

7. Claims 1 to 6, 8 to 10, 32 to 38, 68 and 70 are rejected under 35 U.S.C. § 102(e) as being anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as obvious over Brown et al. (U.S. Patent No. 5,792,594).

Brown et al. show all aspects of the instant invention (e.g. Figure 4 and Column 8 Lines 3 to 47) including:

- an intermediate conductive layer **22** made of a refractory metal (nickel and palladium; Column 6 Lines 39 and 40) in electrical and physical contact with a structure **12** of a semiconductor device, said structure located beneath a silicon oxide-containing protective layer **11** (Brown et al. state the structure **12** could be "located anywhere in an integrated circuit (not shown) formed in or on the surface of the substrate **10**"; Column 4 Lines 63 to 67)
- an electrically conductive contact layer **26** in electrical contact with said intermediate conductive layer
- an electrical and thermal insulator component **14**, **14a**, **34** made of resin and enveloped and sandwiched between said intermediate conductive and electrically conductive contact layers

As to the grounds of rejection under section 103(a), how the contact is made does not affect the final device structure. See MPEP § 2113 which discusses the handling of "product by process" claims and recommends the alternative (§ 102 / § 103) grounds of rejection.

Brown et al. state that the opening **16** (Figure 2B) could be sized to any shape as desired by one skilled in the art. Therefore, one skill in the art could form the opening so that the intermediate conductive layer abuts the silicon oxide-containing protective layer as claimed (Claims 68 and 70).

The Specification contains no disclosure of either the critical nature of the claimed arrangement or any unexpected results arising therefrom (the Specification only mentions preferred values). Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). Since the Applicant has not established the criticality of the thicknesses of the intermediate conductive layer and the contact layer and since these thicknesses are in common use in similar devices in the art, it would have been obvious to one of ordinary skill in the art to use these values for the stated layers in the device of Brown et al.

8. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable Brown et al. in view of Whitten et al. (U.S. Patent No. 5,451,811)

Brown et al. discloses the claimed invention (Paragraph 4) except that the contact layer comprises copper instead of at least one of a refractory metal, a refractory metal nitride and aluminum. Whitten et al. teach (Column 4 Lines 55 to 57) that refractory metals (i.e. titanium-tungsten and molybdenum) are equivalent conductive materials known in the art. Therefore, because these conductors were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute refractory metals for copper.

9. Claims 7, 12 to 19, 39 to 54, 56 to 66, 69 and 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (U.S. Patent No. 5,296,716) in view of Brown et al.

Ovshinsky et al. show most aspects of the instant invention (e.g. Figure 1) including a phase change memory element **30** located beneath the surface of an electrode **42** bearing silicon oxide-containing layer **44**. Ovshinsky et al. does not show a contact

for the memory element as claimed including the intermediate conductive layer, the contact layer and the insulator component enveloped by said layers. Brown et al. teaches (Paragraph 4 above) to use a contact structure as claimed adjacent to the memory element (pad **12** of Brown et al. would be pad **14** of Sasaki) to reduce costs, promote high throughput and shorten cycle times (Column 2 Lines 58 to 60). It would have been obvious to a person of ordinary skill in the art at the time of invention to use the contact structure as taught by Brown et al. in the device of Ovshinsky et al. to reduce costs, promote high throughput and shorten cycle times.

10. Claims 20, 55 and 67 rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. in view of Brown et al., as applied to Claims 12, 45 and 56 above, and in further view of Whitten et al.

Ovshinsky et al. in view of Brown et al. disclose the claimed invention (Paragraph 6) except that the contact layer comprises copper instead of at least one of a refractory metal, a refractory metal nitride and aluminum. Whitten et al. teach (Column 4 Lines 55 to 57) that refractory metals (i.e. titanium-tungsten and molybdenum) are equivalent conductive materials known in the art. Therefore, because these conductors were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute refractory metals for copper.

Response to Arguments

11. Applicant's arguments filed 5/8/02 have been fully considered but they are not persuasive. The Applicant states that the conductive layer of Brown et al. is not in contact and electrical communication with a structure located beneath a silicon oxide-containing protective layer as stated, for example, in Claim 1. However, Brown et al. state that the structure **12** can be located anywhere in an integrated circuit formed in or on the surface of the substrate **10** (Column 4 Lines 63 to 67). Although the example given by Brown et al. shows the structure **12** to be laterally surrounded

by a dielectric layer **11**, the structure can be located below to the dielectric and, therefore, is within the scope of the invention as claimed.

The express, implicit, and inherent disclosures of a prior art reference may be relied upon in the rejection of claims under 35 U.S.C. 102 or 103. "The inherent teaching of prior art reference, a question of fact, arises both in the context of anticipation and obviousness." *In re Napier*, 55 F.3d 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995) (affirmed a 35 U.S.C. 103 rejection based in part on inherent disclosure in one of the references). See also *In re Grasselli*, 713 F.2d 731, 739, 218 USPQ 769, 775 (Fed. Cir. 1983). In the instant case, the melting point of the conductive materials in the prior art are well above any temperature required to switch a phase change component (e.g. Al has a melting temperature of 933 °K and Cu is 1356 °K). Also, the thermal insulative properties of the materials used by the prior art are an inherent property.

The Applicant states that the copper conductive portions of the contact of Brown et al. could not be used since it is well known in the art that copper reacts with silicon-containing materials to cause the copper to blister or delaminate from adjacent silicon structures. However, Brown et al. specifically teach to use copper (Column 8 Lines 3 to 36) and, since all U.S. Patents are considered enabling, the use of copper is assumed to be proper. Similar arguments can be made for Whitten et al. who teach the equivalent of refractory metals and copper. Additionally, Brown et al. show an intermediate layer **14** between the dielectric layer **11** and copper layer **26**. One of ordinary skill could just as easily extend the intermediate layer so that it is always between the dielectric layer and the copper (for example).

In view of these reasons and those set forth in the present office action, the rejections of the stated claims stand.

Art Unit: 2814

12. Applicant's arguments with respect to claims 12 to 20, 39 to 67, 69 and 71 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

13. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications. The official TC2800 Before-Final, **(703) 872-9318**, and After-Final, **(703) 872-9319**. Fax numbers will provide the fax sender with an auto-reply fax verifying receipt of their fax by the USPTO.

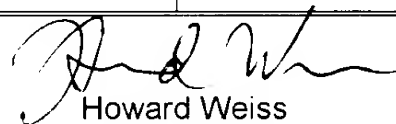
14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Howard Weiss** at **(703) 308-4840** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via **Howard.Weiss@uspto.gov**.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist** at **(703) 308-0956**.

Art Unit: 2814

15. The following list is the Examiner's field of search for the present Office Action:

| Field of Search | Date |
|--|---------------|
| U.S. Class / Subclass(es): 257/ 530; 438/ 600, 601 | thru 10/18/02 |
| Other Documentation: none | |
| Electronic Database(s): EAST | thru 10/18/02 |


Howard Weiss
Patent Examiner
Art Unit 2814

HW/hw
18 October 2002